REMARKS

This Amendment A is responsive to the first Office Action on the merits dated August 25, 2004. Applicants respectfully submit that claims 1, 2, 4, 5, 7-12, 14-19, 21-23, and 30 as set forth herein are in condition for allowance, and request allowance of claims 1, 2, 4, 5, 7-12, 14-19, 21-23, and 30 as set forth herein.

The Status of the Claims

Claims 1-24 have been substantively examined. Claims 25-29 have been withdrawn by the Examiner in response to a previous restriction.

Claims 1-24 stand rejected for certain deficiencies under 35 U.S.C. § 112, 2nd paragraph.

Claims 1-3, 19, 21, and 24 stand rejected under 35 U.S.C. § 102(e) as anticipated by Ninomiya et al., U.S. 6,083,575 (hereinafter "Ninomiya") or, in the alternative, these claims stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ninomiya.

Claims 4-5, 18, and 22-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ninomiya.

Claims 6-17 and 20 are indicated as containing potentially allowable subject matter.

The references not found in the scanned USPTO file are supplied herewith

Applicants include below a duplicate copy of the return postcard indicating receipt at the USPTO of the references on the June 7, 2002 IDS including 8 patent references, 4 foreign references, and 7 articles. Applicants include with this Amendment duplicate copies of the references and articles indicated in the Office Action as missing from the USPTO file, including: EP0568355, JP08179286, JP11153787, JP11237612, and the Kobayashi et al., Nazarenko et al., Corvazier et al., Jain et al., and Shimada articles.

RECEIVED COMMUNICATION DATED: May 30, 2002

IN: Kumar et al. U.S. Patent Application No. 10/070,396 entitled "FABRICATION OF ALIGNED LIQUID CELL/FILM BY SIMULTANEOUS ALIGNMENT AND PHASE SEPARATION"

Information Disclosure Statement
PTO Form 1449
8 U.S. patent references; 4 foreign references & 7 articles

RLW/JJC/cw KSU.P0201

The 35 U.S.C. § 112 deficiencies have been addressed

Claim 1 has been amended to more clearly define the relationship between the applying of polarized light, the inducing of phase separation, and resultant phase separated and aligned structure.

Claims 4-6 has been amended to clarify that this claim limits the applying operation of claim 1, and to clarify the geometric arrangement of the light source, polarizer, and substrate.

Claims 7-13 have been amended to change "second substrate" to "substrate" in most places. These amendments obviate the ambiguity between the two substrates cited in the Office Action, and are also consistent with the specification.

Claim 14 has been amended to clarify that the thermal process is part of the inducing of phase separation.

Claim 16 has been amended to clarify that the epoxy and resin are components of the initial prepolymer.

Claim 19 has been amended to specify liquid crystal material, and to change the "phase separation" processes to

"polymerization" processes. This amendment is supported in the original specification at least at page 8 lines 19-28.

Claim 23 has been amended to depend from claim 22.

It is believed that these amendments obviate the cited 35 U.S.C. § 112, 2nd paragraph deficiencies. Accordingly, Applicants respectfully request that the rejections under 35 U.S.C. § 112, 2nd paragraph be withdrawn.

Withdrawn claims 25-29 are canceled herein

In the interest of expediting prosecution, withdrawn claims 25-29 are canceled herein. However, Applicants reserve the right to prosecute these claims in a subsequent continuation, continuation-in-part, or divisional application.

Claims 1, 2, 4, 5, 7-12, 14-18 and 30 patentably distinguish over the cited references

Claim 1 as set forth herein calls for a method for fabricating simultaneously a phase separated organic film with alignment. A mixture of liquid crystal, prepolymer and polarization-sensitive material is prepared and disposed on a substrate. A polarized light from a light source is applied to said mixture disposed on the substrate. Phase separation of said mixture is induced simultaneously during said applying step to form a separate layer of homogenously aligned liquid crystal material adjacent a separate and distinct layer of polymer and said polarization-sensitive material on said substrate. The inducing includes polymerizing the prepolymer to generate the polymer layer. The alignment of the phase separated liquid crystal layer is induced by alignment of the polymer and polarization-sensitive material layer caused by the simultaneously applying of the polarized light.

Ninomiya does not disclose or fairly suggest phase separation induced simultaneously during applying of polarized light to form a separate layer of homogenously aligned liquid

crystal material adjacent a separate and distinct layer of polymer and polarization-sensitive material.

Ninomiya relates to polymer dispersion type liquid crystals (PDLC) in which liquid crystals are dispersed in interstices of polymers of a three-dimensional structure. Ninomiya col. 1 lines 7-15). The PDLC forming method of Ninomiya produces a single layer of polymer with liquid crystals arranged in interstices of the polymer layer. In contrast, the method of claim 1 calls for forming a phase-separated composite organic film (PSCOF) including a layer of homogenously aligned liquid crystal material and a separate and distinct layer of polymer.

As noted in the background of the present application (page 2 lines 18-19), the method for forming PSCOF is similar to that used to form PDLC. Both methods typically involve forming a prepolymer mixture and causing polymerization that leads to phase separation of the liquid crystal from the polymer. However, in PDLC, phase separation conditions lead to a single layer of polymer with interstitial liquid crystals, whereas in PSCOF the phase separation conditions lead to separate layers of liquid crystal material and polymer material.

Claim 1 and the method of Ninomiya are similar in that both use polarized light to induce liquid crystal alignment during phase separation. However, the skilled artisan having Ninomiya at hand would have had no reasonable expectation of success in achieving alignment of a phase separated liquid crystal layer based on the alignment of interstitial liquid crystals disclosed in Ninomiya. Ninomiya's interstitial liquid crystals are surrounded by polymer, providing extensive contact area between for the polymer to induce liquid crystal alignment.

In contrast, there is much less contact area between the liquid crystal and polymer layers of claim 1. The reduced contact area would be expected to be substantially less effective in inducing homogenous alignment in the liquid crystal layer. Accordingly, the skilled artisan would be unlikely to be motivated by Ninomiya to attempt to achieve simultaneous liquid

crystal layer phase separation and alignment using polarized light, as called for in claim 1.

For at least the above reasons, it is respectfully submitted that claims 1, 2, 4, 5, 7-12, 14-18, and 30 as set forth herein patentably distinguish over the cited references. Accordingly, Applicants ask for allowance of claims 1, 2, 4, 5, 7-12, 14-18, and 30 as set forth herein.

Claims 19 and 21-23 patentably distinguish over the cited references

Claim 19 as set forth herein calls for a method for fabricating a liquid crystal device with alignment properties. A first mixture includes at least a first polarization-sensitive agent and a prepolymer. A second mixture includes at least a second polarization-sensitive agent and a prepolymer. A liquid crystal material is mixed into either the first or second mixture. The first mixture is disposed on a substrate, and the second mixture is disposed over the first mixture. A first polymerization process is applied to the first mixture, and a second polymerization process is applied to the second mixture. The first and second polymerization processes are each selected from the group consisting of (i) applying polarized visible light, (ii) applying polarized ultraviolet light, (iii) applying thermal induction, (iv) applying chemical induction, and (v) applying solvent induction. The polymerization processes cause the liquid crystal material to phase separate into a separate and distinct phase-separated liquid crystal layer. At least one of the first and second polymerization processes apply polarized visible or ultraviolet light that imparts orientational alignments to said liquid crystal layer.

Ninomiya does not disclose or fairly suggest polymerization processes that cause the liquid crystal layer to phase separate into a separate and distinct phase-separated liquid crystal layer. Ninomiya also does not disclose or fairly suggest at least one of first and second polymerization processes applying

polarized visible or ultraviolet light that imparts orientational alignments to said liquid crystal layer.

Moreover, the use of polarized light during phase separation in Ninomiya to induce alignment of liquid crystals positioned at interstices of a polymer layer does not make obvious the method of claim 19 which calls for aligning a separate and distinct liquid crystal layer during a polymerization process that includes applying polarized light. One skilled in the art would have no reasonable expectation, based on alignment of the interstitial liquid crystals in Ninomiya, that a separate and distinct phase-separated liquid crystal layer could be aligned by polarized light applied in phase separation.

CONCLUSION

Applicants respectfully submit that claims 1, 2, 4, 5, 7-12, 14-19, 21-23, and 30 as set forth herein are in condition for allowance, and therefore request allowance of claims 1, 2, 4, 5, 7-12, 14-19, 21-23, and 30 as set forth herein.

Respectfully submitted,

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Enclosures:
EP0568355
JP08179286
JP11153787
JP11237612
Kobayashi et al. article
Nazarenko et al. article
Corvazier et al. article
Jain et al. article
Shimada article